US009632344B2

(12) **United States Patent**
Ludwig

(10) **Patent No.: US 9,632,344 B2**
(45) **Date of Patent: Apr. 25, 2017**

(54) **USE OF LED OR OLED ARRAY TO IMPLEMENT INTEGRATED COMBINATIONS OF TOUCH SCREEN TACTILE, TOUCH GESTURE SENSOR, COLOR IMAGE DISPLAY, HAND-IMAGE GESTURE SENSOR, DOCUMENT SCANNER, SECURE OPTICAL DATA EXCHANGE, AND FINGERPRINT PROCESSING CAPABILITIES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/961,611**

(22) Filed: **Aug. 7, 2013**

(65) **Prior Publication Data**

US 2014/0036168 A1 Feb. 6, 2014

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/180,345, filed on Jul. 11, 2011.
(Continued)

(51) **Int. Cl.**
G09G 3/32 (2016.01)
G02F 1/1333 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G02F 1/13338*** (2013.01); ***G06F 3/044*** (2013.01); ***G06F 3/0412*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G06F 3/0412
(Continued)

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(57) **ABSTRACT**

A system and method for implementing a display which also serves as one or more of a tactile user interface touchscreen, proximate hand gesture sensor, light field sensor, lensless imaging camera, document scanner, fingerprint scanner, and secure optical communications interface. In an implementation, an OLED array can be used for light sensing as well as light emission functions. In one implementation a single OLED array is used as the only optoelectronic user interface element in the system. In another implementation two OLED arrays are used, each performing and/or optimized from different functions. In another implementation, an LCD and an OLED array are used in various configurations. The resulting arrangements allow for sharing of both optoelectric devices as well as associated electronics and computational processors, and are accordingly advantageous for use in handheld devices such as cellphone, smartphones, PDAs, tablet computers, and other such devices.

20 Claims, 22 Drawing Sheets